REMARKS

In paragraph 1 of the Office Action it is indicated that claims 29-40 are withdrawn from further consideration in response to Applicant's election. Applicant confirms its election.

Also in paragraph 1 of the Office Action it is indicated that receipt is acknowledged of the Applicant's IDSes received February 26, 2002 and October 15, 2004. Applicant appreciates the receipt and review of the Applicant's cited prior art.

In paragraph 2 of the Office Action it is indicated that the Fig. 2 and 3 should be designated as --prior art--. Responsive thereto, Applicant has provided replacement sheets herewith which indicate that Figs. 2 and 3 are prior art. Marked-up amended drawings are also provided. Furthermore Applicant has previously submitted formal drawings, mailed to the USPTO on April 8, 2002, and Applicant notes that there is no mention of the formal drawings in the Office Action. Rather, the Office Action refers to the informal drawings that were filed with the application. Therefore, also submitted herewith is a Replacement Sheet of drawings which replaces sheets 2 and 3 of the informal drawings originally submitted. Replacement sheet 2 includes Figs. 5-9, whereas in the originally submitted informal drawings, Figs. 5, 6 and 7 were found on sheet 2 and Figs. 8 and 9 were found on sheet 3 of those informal drawings. Should the Examiner have any questions with regard to these drawings, a telephonic conference with the undersigned at the number set forth below is respectfully requested.

In paragraphs 3, 4 and 5 of the Office Action claims 1-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Chen et al (US 6,183,859).

> "Applicant's Admitted Prior Art (AAPA) shows in figure 2 a magnetic head 30 including a spin valve sensor 50 with a magnetic shield layer 34 being fabricated above a substrate base 42. Figure 3 shows a first electrical insulation layer first electrical insulation layer 44 being fabricated above the shield layer 34 and a spin valve sensor 50 structure being disposed above the first electrical insulation layer 44 layer. The spin valve sensor 50 structure of AAPA includes a seed layer 76/80/84 being fabricated above the first electrical insulation layer 44 layer. A PtMn layer is disposed above the seed layer 76/80/84 and at least one pinned magnetic layer and at least one free magnetic layer is disposed above the PtMn layer. The seed layer 76/80/84 includes an A1 sublayer, an NiMnO sublayer, and an Ta sublayer.

The Ta seed sublayer of AAPA is fabricated to have a thickness of approximately 10 to 40 Angstroms. ppi AAPA shows in figure 3 that the spin valve sensor 50 layers include at least one pinned magnetic layer having a composition including CoFe and at least one spacer layer having a composition including Cu with at least one free magnetic layer having a composition including Co or CoFe.

AAPA discloses that the sublayer has an upper surface. As the claims are directed to a spin valve sensor, per se, the method limitation appearing in claim 7 has only been accorded weight to the extent that it affects the structure of the completed spin valve sensor. Note that " of patentability in 'product-by-process' claims is based on product itself, even though such claims are limited and defined by process ["etched"], and thus product in such claim is unpatentable if it is the same as, or obvious form, product of prior art, even if prior product was made by a different process", in re Thorpe, et al., 227 USPQ 964 (CAFC 1 95' Furthermore, note that a " claim, although reciting subject matter of claim in terms of how it is made ["etched"] is still product claim; it is patentability of product claimed and not recited process steps that must be established, in spite of fact that claim may recite only process limitations", in re Hirao and Sato, 190 USPQ 685 (CCPA 1976).

AAPA, however, is silent as to a sublayer of the seed layer being Si. AAPA is also silent as to the seed sublayer being fabricated to have a thickness of approximately 20 Angstroms and the PtMn layer having a thickness of approximately 120 Angstroms. Chen et al discloses in the paragraph bridging columns 3 and 4 a sublayer of a seed layer being either Ta or Si.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to substitute the Ta layer of AAPA with a Si layer as taught by Chen et al. The rationale is as follows: one of ordinary skill in the art at the time the invention was made would have been motivated to substitute a Ta layer with a Si layer, which is well within the purview of a skilled artisan and absent an unobvious result, because the two layers are art recognized equivalents.

It also would have been obvious to a person having ordinary skill in the art at the time the invention was made to fabricate the seed sublayer of AAPA to have a thickness of approximately 20 Angstroms and the PtMn layer of AAPA to have a thickness of approximately 120 Angstroms. The rationale is as follows: one of ordinary skill in the art at the time the invention was made would have been motivated to fabricate the seed sublayer to have a thickness of approximately 20 Angstroms (down from 35 Angstroms) and the PtMn layer to have a thickness of approximately 120 Angstroms (down from 150 Angstroms), which is well within the purview of a skilled artisan and absent an unobvious result, to reduce the size of the spin valve sensor."

Responsive hereto, Applicant has amended independent claims to further clarify Applicant's invention, specifically that the PtMn antiferromagnetic layer is disposed directly upon the Si seed layer. With regard to the substance of this rejection, Applicant respectfully traverses the

rejection and asserts that the fabrication of a PtMn antiferromagnetic layer upon an Si seed layer is neither taught by nor obvious from the cited prior art.

Applicant's invention, as described and claimed, is directed to the fabrication of a PtMn antiferromagnetic layer upon an Si seed layer. The application provides data in Table I (page 11 of the specification) and in Figs. 6, 7, 8 and 9 which demonstrate the significant reduction in the thickness of the PtMn antiferromagnetic layer and enhanced performance that can be obtained when it is fabricated upon an Si seed layer. The prior art neither teaches nor renders obvious this invention, as is next described.

Firstly, Applicant's admitted prior art (AAPA) teaches the well known fabrication of a PtMn antiferromagnetic layer upon a Ta seed layer (see Fig. 2 (Prior Art)). The PtMn antiferromagnetic layer thickness is approximately 150 Å, and the application describes the desired in the industry to reduce the magnetic sensor read gap. The present invention describes and claims the inventor's discovery that this can be accomplished by fabricating the PtMn antiferromagnetic layer upon an Si seed layer which enables a reduction in the thickness of the PtMn antiferromagnetic layer (and therefore the read gap) while maintaining (or improving) the dR/R performance characteristics of the sensor.

Chen '359 teaches nothing with regard to the characteristics of a PtMn antiferromagnetic layer; it does not even mention an antiferromagnetic layer, nor does it mention PtMn. Therefore, Chen teaches nothing with regard to the advantages that could be obtained by fabricating a PtMn antiferromagnetic layer upon an Si seed layer, as opposed to the prior art tantalum seed layer.

What Chen does teach is the use of a seed layer in association with an aluminum barrier layer of a MTJ (magnetic tunnel junction) sensor. Specifically, (and as identified in the rejection) in col. 3, line 66 - col. 4, line 2, Chen states:

> "In a preferred embodiment, the seed material includes one or more of Cu, Si, Ta, Ti, or the like and the dominant material includes aluminum."

Chen '859 teaches nothing with regard to the benefits of using an Si seed layer in place of a prior art Ta seed layer for fabricating a PtMn antiferromagnetic layer. In fact, Chen teaches nothing with regard to the advantage that is obtained by replacing a prior art Ta seed layer with an Si seed layer, even with regard to the aluminum barrier layer. It essentially indicates that they are equivalent in the aluminum barrier that MTJ sensor environment.

Furthermore, a close reading of Chen, col. 3, line 58-67, teaches that in an embodiment where a seed layer is utilized, the dominant element of the tunnel barrier layer is aluminum and

the trace element in the tunnel barrier layer is the same substance that is utilized to fabricate the seed layer. Thus, Chen '859 teaches that where an Si seed layer is used, the layer fabricated upon it should include Si as a trace element, where the dominant element is aluminum. This does not relate to the advantages achieved for a PtMn antiferromagentic layer fabricated upon an Si seed layer of the present invention.

In the Office Action it is further indicated that claims 7, 8, 21 and 22, which describe an "etched surface" of the Si seed layer are rejected as product by process claims. Responsive thereto, Applicant has amended claims 7, 8, 21 and 22 to describe the upper surface of the Si seed layer as a product limitation rather than a process limitation; specifically, that the crystallographic surface of the Si seed layer surface differs from that of a deposited Si seed layer. The enhanced performance of Applicant's sensor related to this limitation is set forth in Table I and described in Applicant's specification. There is no teaching whatsoever with regard to this limitation in the cited prior art, and Applicant respectfully submits that claims 7, 8, 21 and 22 are thereby rendered allowable.

In conclusion, Applicant respectfully submits that Chen neither teaches nor renders obvious Applicant's claimed sensor having an Si seed layer upon which a PtMn antiferromagnetic layer is advantageously fabricated. Furthermore, Chen provides no motivation to try to substitute an Si seed layer for a TA seed layer in that Chen describes no advantages that are obtained from even for an aluminum plus Si (not even a PtMn) layer fabricated thereon). Applicant therefore respectfully submits that amended independent claims 1, 8, 15 and 22 recite subject matter that is neither taught by nor obvious from the cited prior art.

With regard to dependent claims 2-7, 9-14, 16-21 and 23-28, Applicant additionally submits that these claims recite specific Si seed layer thicknesses and compositions and specific PtMn layer thicknesses that are neither taught by nor obvious from the cited prior art. Additionally, Applicant urges that the dependent claims are allowable in that they depend, either directly or indirectly, from allowable independent base claims.

With regard to the comment in the Office Action regarding inventorship, Applicant asserts that the inventors are properly identified.

Having responded to all of the paragraphs of the Office Action, and having amended the claims accordingly, Applicant respectfully submits that the Application is now in condition for allowance. Applicant therefore respectfully requests that a Notice of Allowance be forthcoming

at the Examiner's earliest opportunity. Should the Examiner have any questions or comments with regard to this amendment, a telephonic conference at the number set forth below is respectfully requested.

Respectfully submitted,

Dated: April 29, 2005

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CERTIFICATE OF MAILING (37 CFR 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited on April 29, 2005 with the U.S. Postal Service as first class mail in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: April 29, 2005

Patricia Beilmann

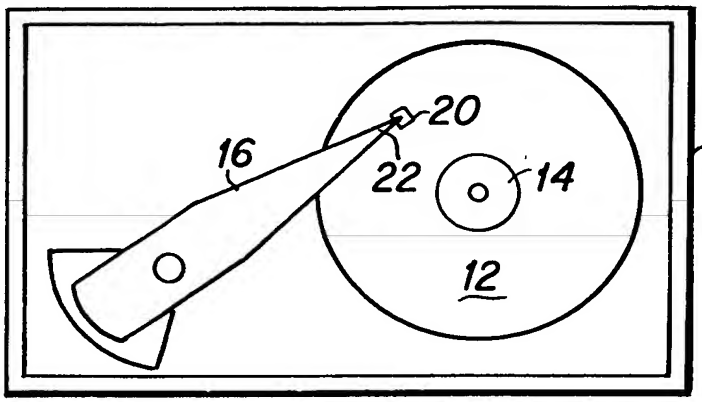

Fig.1

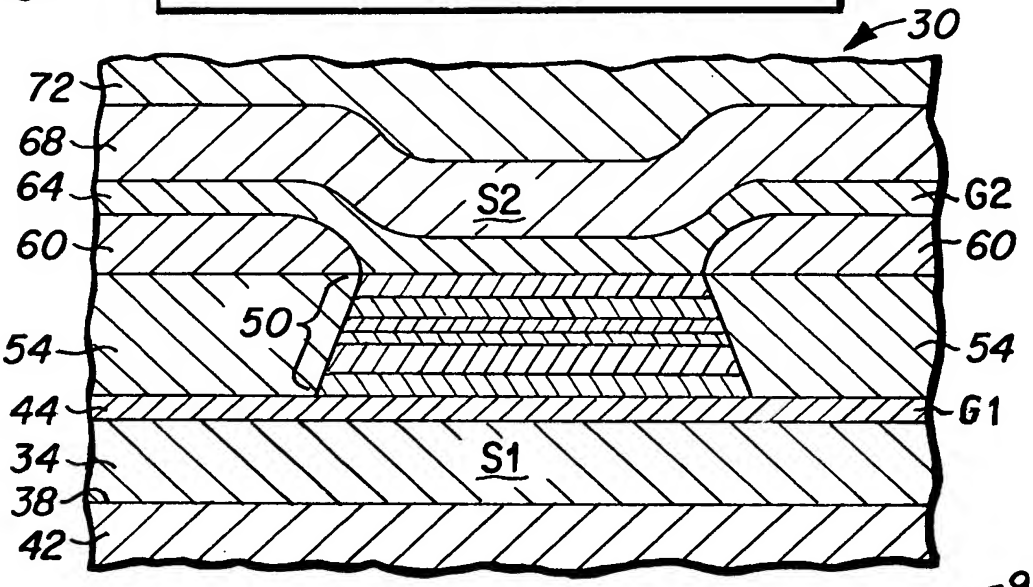

Fig.2
(PRIOR ART)

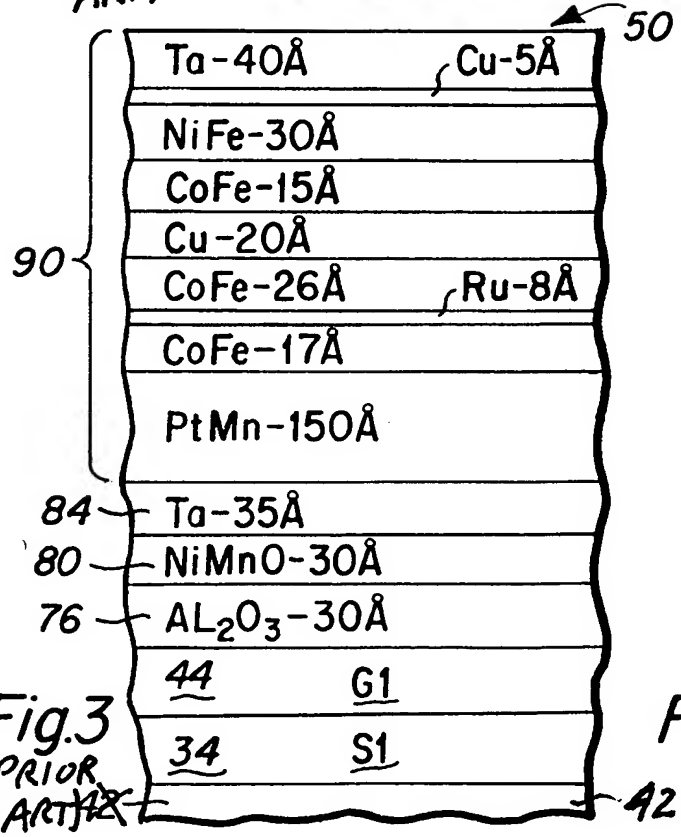

Fig.3
(PRIOR ART)

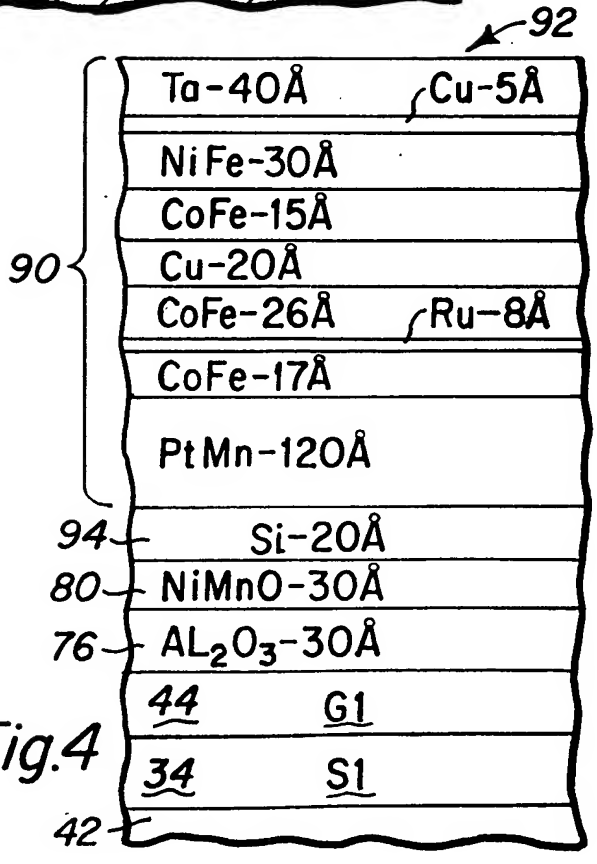

Fig.4